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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,926	02/04/2004	Glen McLaughlin	PA2699US	6059
22830	7590	03/18/2009	EXAMINER	
CARR & FERRELL LLP			GUPTA, VANI	
2200 GENG ROAD			ART UNIT	
PALO ALTO, CA 94303			PAPER NUMBER	
			3768	
			MAIL DATE	
			DELIVERY MODE	
			03/18/2009	
			PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/772,926	Applicant(s) MCLAUGHLIN ET AL.	
	Examiner VANI GUPTA	Art Unit 3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1 – 8, 10 – 16, and 18 – 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley (US 6,120,448) in view of Proudian, deceased et al. (US 4,917,097).

Regarding claims 1 – 6, 10 – 16, and 18 – 24, Bradley discloses a system, comprising signal generator, signal transmitter, a receiver unit, and data processor, which utilizes multiple out-of-phase ultrasonic waveforms to enhance imaging of body tissue of a patient (fig. 1; and col. 2, lines 3 – 32; col. 4, lines 3 – 32).

With respect to claim 1, 15, 16, and 18, Bradley discloses that the receiver receives at least two-out-of-phase pulses modified by the tissue of the body (col. 2, lines 13 - 17).

However, Bradley differs from claims 1, 15, 16, and 18 in that he does not specifically disclose that the receiver unit (fig. 1, #16) further comprises a raw data averager that receives at least two out-of-phase pulses modified by the media of interest, wherein the receiver and raw data averager unit provides a point-by-point arithmetic average of the received at least two out-of-phase pulses modified by the media of interest.

Nonetheless, *Proudian, deceased et al.* (hereinafter *Proudian*) teaches an dynamic signal averager, that as signals are detected, averages the signals in order to produce a single collective

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signal for each transducer channel. Thereafter, the signal is digitized following a series of steps, and “collected” for imaging processing. It is after this that the digitized and averaged signal is further processed for imaging (col. 18, line 60 - col. 19, line 37).

Additionally, as known in the art, averaging inherently involves arithmetic-based calculations that average all points or values of interest.

Accordingly, Proudian complements Bradley by teaching an averager whose processing capabilities includes a step of converting image information from polar to Cartesian coordinates, which provides gray scale information for more accurate images on a screen of a video display (col. 19, lines 32 – 40).

Therefore, it would have been prima facie obvious to have modified the teachings of Bradley to include raw data averager with the receiver unit to obtain more accurate images in the instant claims 1, 15, 16, and 18.

With respect to **Claims 7 and 8**, Bradley discloses using an envelope function to assist the signal generator in convolving the multiple out-of-phase signals (col. 2, lines 64 – 67). He does not specifically disclose using a Gaussian or chirped waveform envelope function.

However, Examiner notes that the Applicant does not state that the type of waveform generated is an important consideration of the present invention, and therefore, lacking any further clarity and/or criticality, utilizing either waveform is an obvious matter of design choice, wherein no unstated problem is solved or unexpected result is obtained when using either type.

With respect to **Claims 11 and 12**, although Bradley does not specifically state that his system utilizes a digital or analog delay circuit, he does explain that his transmitter can either be analog or digital system (col. 4, lines 3 – 6), and since Bradley discusses transmitting two out-of-

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phase pulses (col. 4, lines 10 – 11), and one of ordinary skill is aware that a transmitter would be coupled to a delay circuit configured to delay the transmission of at least two-out-phase pulses into the media. Furthermore, one of ordinary skill is aware that whether the delay circuit is digital or analog circuit, both performs the same way. Furthermore, one of ordinary skill in the art is also aware that at the time of the invention, either a digital or analog delay circuit can be retrofitted with Bradley's ultrasonic imaging system, depending upon whether Bradley's ultrasonic imaging system was originally manufactured with as digital or analog ultrasonic imaging.

Additionally, Examiner notes that the Applicant does not establish the type of delay circuit or analog circuit to be critical to the present invention. Therefore, lacking any further clarity and/or criticality, using either an analog or digital delay circuit is an obvious matter of design choice, wherein no unstated problem is solved or unexpected result is obtained when using either type since either delay circuit can effectively provide proper signal delay, depending upon cost and reliability factors, etc.

With respect to claims 10 and 13, one of ordinary skill in the art would be aware that all ultrasound imaging systems comprise transmitters that further comprise a power amplifier, transmit/receive switch, and transducer to perform basic ultrasonic imaging tasks which involve transmitting ultrasonic signals into a medium of interest, receive the echoed signals, and transducer or modify these echoed signals into an appropriate format for image processing, as is known in the art and depicted by Figure 1 of Bradley et al.

With respect to providing a channel gain circuit to drive the power amplifier, one of ordinary skill in the art would be aware that this is typically done to optimize performance of the

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ultrasound imaging system, specifically the transmitter with respect to the number of channels used and/or provided during an particular time of signal transmission, while keeping costs down.

With respect to **Claims 22 – 24**, Bradley discloses that images of the preferred region of the patient are displayed on a display (fig. 1, #32).

Bradley does not specifically state that display is a computer monitor, flat-panel display, or liquid-crystal display (LCD).

However, as is known to one of ordinary skill in the art, variety of state-of-the art image display units such a “computer monitor,” or “flat-panel display,” or “liquid-crystal display or LCDs” are used to display an area of acoustic image for an ultrasound imaging operator to view.

Additionally, Examiner notes that the Applicant states in the Specification that the claimed image display unit “may be any visual display such as, but not limited to, a computer monitor, flat-panel or LCD, cathode-ray tube, or the like” (p. 14, paragraph [0031]). Since the Applicant does not state the criticality for the type of display unit used to display images, it is an obvious matter of design choice, wherein no stated problem is left unsolved or unexpected result obtained in using either type of display apparatus, since any type can effectively display medical images depending upon cost and reliability factors to obtain the invention in the instant Claims 22 – 24.

2. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley (US 6,120,448) in view of Proudian, deceased et al.(US 4,917,097, as applied to Claim 1 above, in further view of Daft et al. (US 5,349,524).

Regarding Claim 17, Bradley in view of Proudian discloses ultrasonic imaging system comprising a receiver and raw data averager unit.

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However, Bradley in view of Proudian does not specifically disclose that the unit further comprises an in-phase and quadrature mixer.

Nevertheless, Daft teaches a mixer that can receive ultrasound signals (*col. 3, lines 38 - 42*). The receiver comprises receiver channels that receive in-phase (I) signals and quadrature (Q) signals as one signal (*col. 11, lines 50 - 54*). Additionally, as is known in the art, during transmission of signals, I/Q mixers are typically used to refine amplitude modulation that more efficiently uses electrical power, while avoiding bandwidth doubling common with amplitude modulation; as is also explained by Daft (*col. 2, lines 15 - 36*).

Accordingly, Daft complements the disclosing of Bradley in view of Proudian by teaching an ultrasonic imaging system for displaying color flow images, and in particular, an adaptive wall filter that automatically adjusts its central frequency and bandwidth as a function of the received echo signal (*col. 3, lines 29 - 33*).

Therefore, it would have been prima facie obvious to modify the receiver and raw data averager unit of Bradley with the teachings of Daft to include the in-phase and quadrature mixer to optimize electrical power within minimal bandwidth of a signal to generate images with optimal quality (*col. 2, line 60 - col. 3, line 2*).

Allowable Subject Matter

- 1. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.***

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Claim 9 is allowed because the subject matter of the independent claims including modulating the multiple “out-of-phase sine waves in a way to produce a chirped Gaussian pulse width modulated waveform” is not taught or reasonably suggested in the prior art of record.

Response to Arguments

In response to Applicant’s arguments that Bradley et al. does not suggest “a receiver and raw data averager providing a point-by point arithmetic average of the received at least two out-of-phase pulses modified by the media of interest,” Examiner directs Applicant to aforementioned rejection of Claim 1.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to VANI GUPTA whose telephone number is (571)270-5042. The examiner can normally be reached on Monday - Friday (8:30 am - 5:30 pm; EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-2083. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/V. G./

Examiner, Art Unit 3768

/Long V Le/

Supervisory Patent Examiner, Art Unit 3768